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SYNOPSIS OF AMERICAN *CARTREMA* (OLEACEAE)

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ABSTRACT

Cartrema Raf. in the USA and Mexico includes two species: **Cartrema americana** (L.) Nesom, **comb. nov.**, and **Cartrema floridana** (Chapman) Nesom, **comb. nov.** (based on *Osmanthus floridanus* Chapman, an earlier name for *Osmanthus megacarpus* Small). *Cartrema americana* occurs in the eastern USA east of the Mississippi River and in Mexico, where it ranges more or less continuously in eastern states from Nuevo León south to Chiapas and in the western states of Sonora, Chihuahua, Durango, and Jalisco. Maps show the distribution in the USA and in Mexico. *Osmanthus americanus* var. *microphyllus* P.S. Green and *Osmanthus mexicanus* Lundell, both from Mexico, are treated here as synonyms of *C. americana*. *Cartrema floridana* is endemic to the Florida peninsula. All other taxa indicated by molecular and morphological data to belong in *Cartrema* are native to southeastern Asia.

KEY WORDS: *Cartrema*, *Osmanthus*, *Osmanthus* sect. *Leiolea*, Oleaceae

The species of *Osmanthus* with a paniculate inflorescence have long been recognized as distinct as a group from those with a fasciculate inflorescence. They were treated as sect. *Leiolea* within *Olea* by Spach (1839) and then within *Osmanthus* by Green (1958). Rafinesque (1838) placed them in the genus *Cartrema*; Small (1933) superfluously created the genus *Amarolea*. In view of accumulating evidence, Weakley et al. (2011) gave notice that the southeastern USA species will be treated within *Cartrema* in forthcoming state and regional floristic accounts, and that disposition is accepted here.

Molecular evidence (Guo et al. 2011) confirms that the species of *Osmanthus* sect. *Leiolea* comprise a monophyletic group. In addition to the American taxa, the group includes five additional species from southeastern Asia — this whole group is more closely related to two Asian species of *Olea* (sect. *Tetrapilus*) than to fasciculate-flowered *Osmanthus*.

The taxonomy of the native American plants of *Cartrema* Raf. (*Osmanthus* sect. *Leiolea*) is reviewed here. These plants extend southward though Mexico to southern Chiapas. Because of the proximity of the Chiapas localities, the Flora of Guatemala (Standley & Williams 1969) included *Osmanthus americanus* as a potential member of the flora, but apparently the species remains undocumented south of Mexico.

CARTREMA Rafinesque, Sylva Tell., 184. 1838. **TYPE**: *Olea americana* L. = *Pausia americana* (L.) Raf. Rafinesque validated the genus name in 1838 but did not provide a nomenclatural combination for the single species he included (see comments below).

Amarolea Small, Man. S.E. Fl., 1043. 1933. *Osmanthus* subg. *Amarolea* (Small) Tzvelev, Novosti Sist. Vyssh. Rast. 34: 146. 2002. **LECTOTYPE** (Johnson 1957, p. 414): *Amarolea americana* (L.) Small ≡ *Olea americana* L. Small did not specify which of the two species of *Amarolea* (*A. americana*, *A. megacarpa*) was the type.

Olea sect. *Leiolea* Spach, Hist. Nat. Veg. Phan. 8: 266. 1839. *Osmanthus* sect. *Leiolea* (Spach) P.S. Green, Notes Roy. Bot. Gard. Edinburgh 22: 454. 1958. **TYPE**: *Olea americana* L. ≡ *Osmanthus americanus* (L.) Benth. & Hook. f. ex A. Gray

Osmanthus sect. *Microsmanthus* Nakai, Bot. Mag. Tokyo 44: 14. 1930. **TYPE**: *Osmanthus marginatus* (Champ. ex Benth.) Hemsl.

KEY TO THE SPECIES

1. Mature drupes (dried) (6–)7–10(–11) mm; se USA and Mexico ..... 1. **Cartrema americana**
1. Mature drupes (dried) 18–25 mm; endemic to Florida ..... 2. **Cartrema floridana**

1. CARTREMA FLORIDANA (Chapman) Nesom, comb. nov. *Osmanthus floridanus* Chapman, Fl. South. U.S., ed. 2, Suppl. 2, 693. 1892. *Amarolea floridana* (Chapman) L.E. Arnold, J. Elisha Mitchell Sci. Soc. 52: 86. 1936. **TYPE**: **USA. Florida**: [Manatee Co.:] Manatee, [sandy pine barrens, without date, *J.H.J Simpson s.n.* (holotype: US!, Fig. 1). The specimen has not been previously noted as a type, but the label apparently is in Chapman's hand.
EPITYPE (designated here): **USA. Florida**: Highlands Co.: Ca. 0.4 mi N of main ranch road at a point ca. 1.4 mi E of US 27 at a point ca. 1.6 mi S of Bald Hill and ca. 7.3 mi S of Bairs Den, ca. 3.4 air mi NE of Venus, Hendrie Ranch, extensive rolling rosemary-scrub oak bald on white sand, dominated by *Ceratiola-Quercus inopina-Q. geminata-Q. chapmanii-Sabal etonia-Serenoa repens*, soils - St. Lucie (Typic Quartzipsamments), 90–130 ft, 9 Nov 1990, *S.L. Orzell 15813* with E.L. Bridges (USF digital image!).
Amarolea megacarpa Small, Man. S.E. Fl., 1043, 1507. 1933. *Osmanthus megacarpus* (Small) Small ex Little, J. Wash. Acad. Sci. 33: 10. 1943. *Osmanthus americanus* var. *megacarpus* (Small) P.S. Green, Notes Roy. Bot. Gard. Edinburgh 22: 462. 1958. *Osmanthus americanus* subsp. *megacarpus* (Small) E. Murray, Kalmia 13: 10. 1983. *Cartrema megacarpa* (Small) Weakley, J. Bot. Res. Inst. Texas 5: 445. 2011. **TYPE**: **USA. Florida**. Highlands Co.: Sandhills near Lake Annie, 8 Jan 1925, *J.K. Small & P. Matthaus 11612* (holotype: NY digital image!; isotypes: GH, US digital image!).

Shrubs, (1–)2–3(–4) m, occasionally characterized as a "small tree." **Stems**: usually 2 or more from the base, sometimes branching near the ground, rarely with a single axis; bark gray-brown to light gray or silvery, smooth, becoming finely scaly. **Leaves** persistent, elliptic to elliptic-oblanceolate or oblanceolate, 5.5–12 cm x 20–40(–50) mm, base cuneate to attenuate, margins entire, revolute, apex acute to short-acuminate or obtuse, glabrous on both surfaces; petioles 3–10 mm. **Inflorescences** axillary, 12–20-flowered. **Pedicels** 0–1 mm. **Flowers** unisexual or rarely bisexual; corolla white to yellow, tube 2–3 mm, lobes 1.5–2.5 mm, ca. equal tube length, plane to loosely involute. **Drupes** dark bluish purple to nearly black, subglobose to broadly ellipsoid or ellipsoid-obovate, 18–25 mm at maturity (dried).

Flowering Feb–May. Sand pine scrub, oak scrub, rosemary balds, dry oak hammocks, turkey oak barrens; 10–100 m; Florida (Map 1).

Floridians have most often treated *Cartrema floridana* at specific rank (for example, using the epithet "megacarpa," Huck et al. 1989; Christman & Judd 1990; Wunderlin & Hansen 2011). Nelson (1994, 1996) was equivocal, observing that it might be regarded either as a species or as a variety of *Osmanthus americanus*, but he later (2010) accepted it at specific rank. Green (1958) treated it at varietal rank, noting that various literature descriptions have given measurements of fruit size that could be interpreted as intermediate. Thus, except for the ambiguity regarding rank, there has been no reluctance in recognizing the existence of the large-fruited entity.

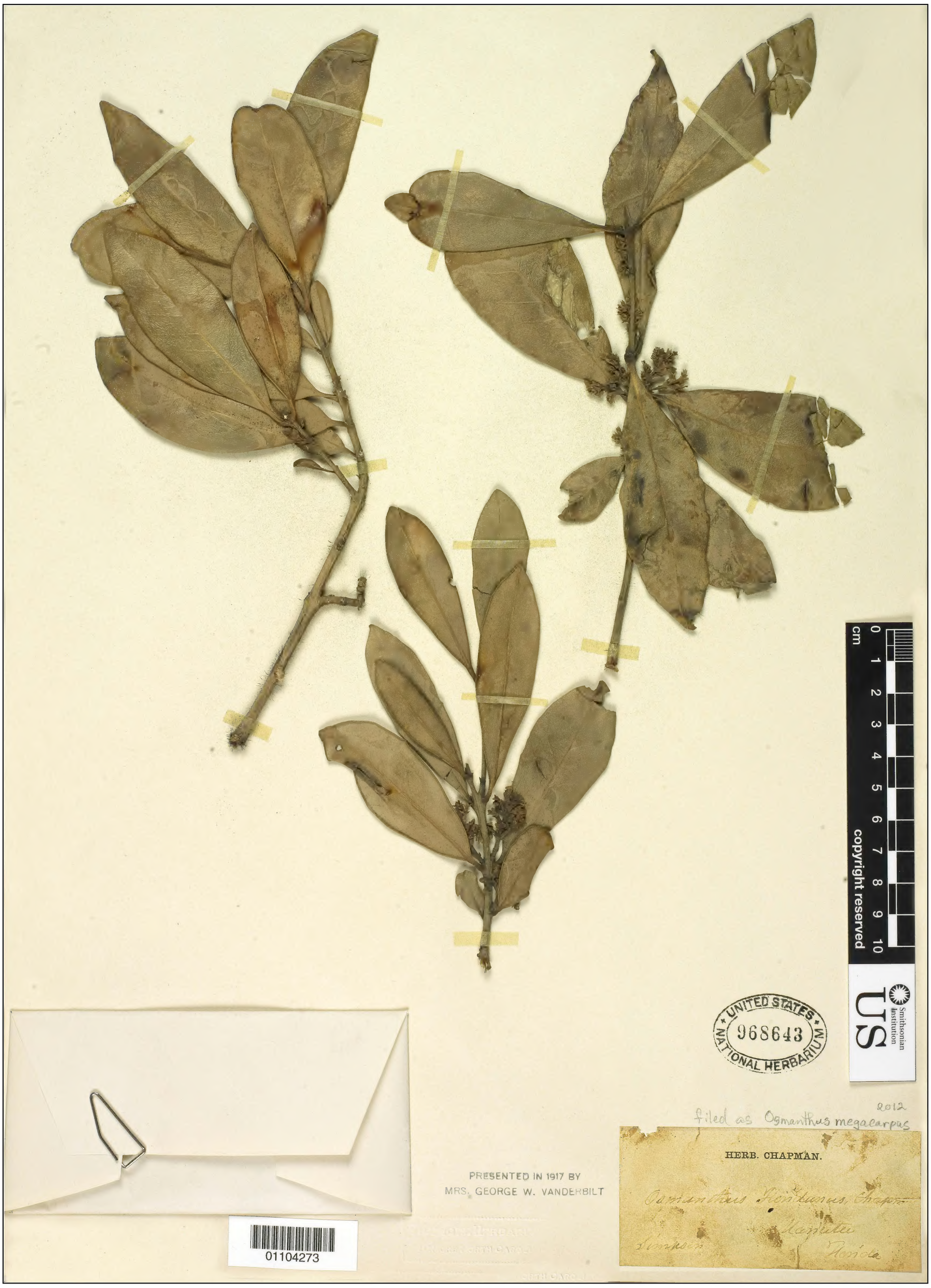


Figure 1. Holotype of *Osmanthus floridanus* Chapman (US). The specimen has not been previously recorded as a type but the label apparently is in Chapman's hand. The labels reads "Osmanthus Floridanus Chapm., Simpson, Manatee, Florida."

The protologue of *Osmanthus floridanus* in its entirety is this: "Inflorescence more or less pubescent; style sigmoid; stigma nearly as broad as the ovary; drupe ovoid, yellowish-green, 8"–9" long. Otherwise like *O. Americanus*. — Sandy pine barrens, Manatee, South Florida. (*J. H. Simpson.*) — A low shrub." This was essentially repeated in the third edition of Chapman's Flora (1897, p. 352). As noted by Chapman in his "Signs Used In This Work" (1889, p. xxvi), he used the double quotation mark to denote meaurement of a "line" (= 1/12 of an inch). The equivalents of 8–9 lines are 8/12–9/12 inch = 0.67–0.75 inch = 17–19 mm. Thus Chapman described drupes characteristic of the large-fruited *Osmanthus* as well as its characteristic habitat. His characterization of the fruits as yellowish-green indicates that they were immature.

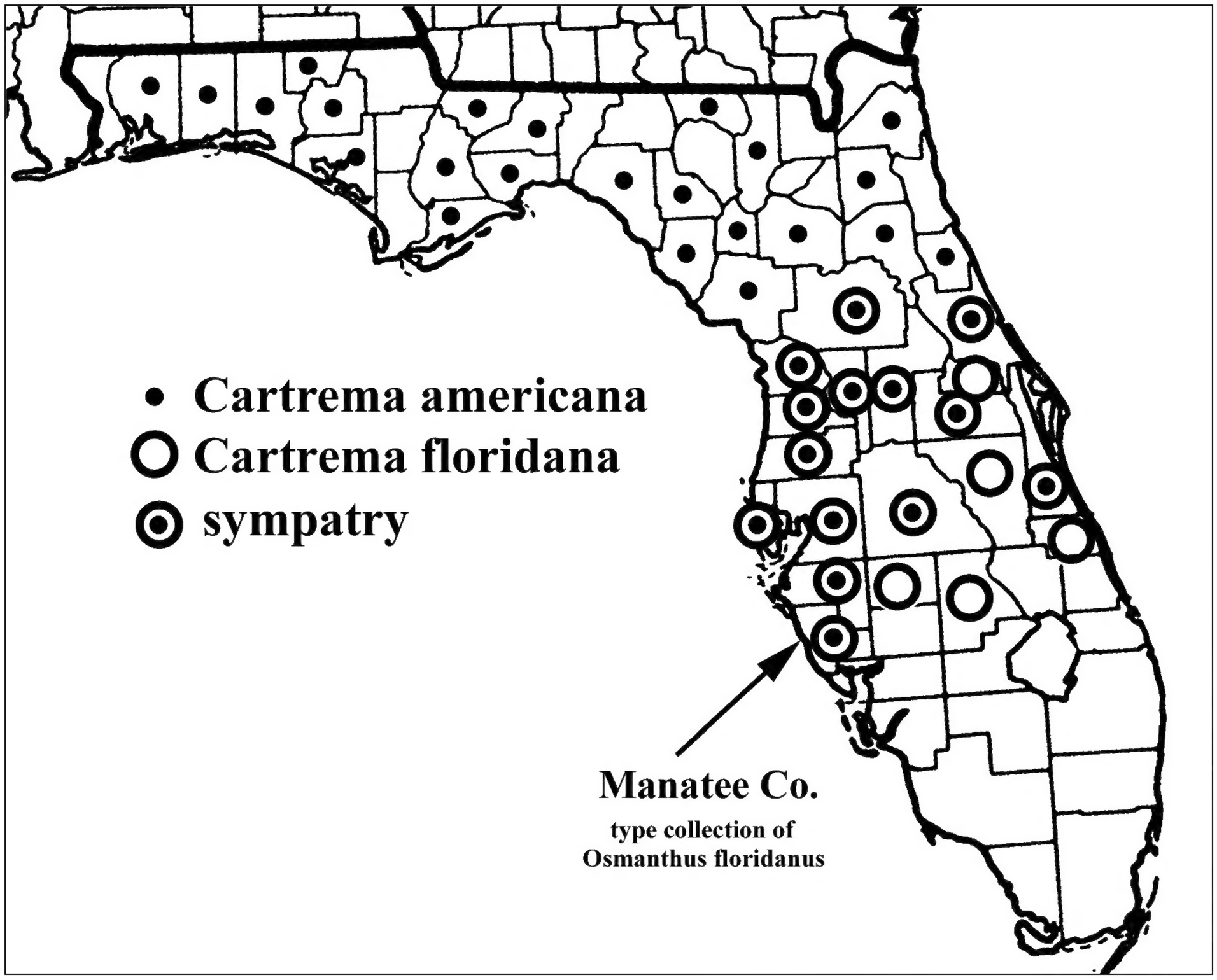
Small included *Osmanthus floridanus* in his "Flora" (1903, 1913), describing it with "drupes yellowish-green, 16–20 mm long," the color and fruit measurements presumably reflecting Chapman's original description. The contrast in fruit size with *O. americanus* was shown by Small in the descriptions but not in the key. For his "Manual" (Small 1933), he had decided that *O. floridanus* was not correctly applied, or perhaps not unambiguously applied, to the large-fruited plants and published the name *Amarolea megacarpa*, treating it along with *A. americana* to constitute the new genus *Amarolea*. *Osmanthus floridanus* was placed in synonymy of *Amarolea americana* and the fruit dimensions for *Amarolea megacarpa* were modified to "2–2.5 cm long" (description)/ "2–2.5 cm in diameter" (key); fruit dimensions for *Amarolea americana* were "10–15 mm long" (description)/ "1 cm in diameter or less" (key).

It is clear, as formalized in the nomenclature here, that Chapman's name was the first to apply to the large-fruited species. The holotype (Fig. 1) is from a plant in flower — designation of an epitype, a specimen with mature fruits, is intended to provide clarity in application of the name.

The large fruit size of *Cartrema floridana* is the single known morphological feature of distinction from *C. americana*, but the difference is striking. Unequivocal identifications are best made during fruit maturity, which is generally mid-August through October and November, but developing fruits that already exceed the size range of *C. americana* support a confident identification.

Fruit size for typical *Cartrema americana* was first determined in the present study by measuring mature fruits from USA localities outside of Florida. The county-level distribution of *C. americana* in Florida (Map 2) was assessed by recording only collections with mature fruits (collected mid-August through fall) — fruits of these plants all were within the measurement range determined from the USA outside of Florida. Similarly, sizes for *C. floridana* were measured only from presumably mature fruits (see Table 2). The only exception is for Manatee County (whence the type of *Osmanthus floridanus*), where documentation of *C. americana* is based on a sterile collection from a wet habitat: "Bay-head," 27 Apr 1917, *Cuthbert 1452* (FLAS-3 sheets). Several collections from Manatee County document the occurrence there of the large-fruited species in dry habitats.

Ecological differentiation between *Cartrema americana* and *C. floridana* is distinct — *C. americana* occurs in moist habitats while *C. floridana* is restricted to dry barrens, scrubs, and xeric hammocks. This difference is so consistent, with few exceptions, that it can be considered essentially diagnostic. In fact, a number of collections without mature fruits (e.g., USF; sterile, flowering, or with immature fruits) within the area of sympatry surely have been identified in both species on the basis of habitat. In any case, enough collections with mature fruit are available that Map 2 in the present study is a close match to the distributions shown by Wunderlin and Hansen (2012).



Map 1. County distribution of *Cartrema americana* and *C. floridana* in Florida. Symbols are placed only on the basis of unequivocal identification through fruit size (see text). Collections were studied first-hand at SMU-BRIT-VDB and TEX-LL; collections from FLAS, FTG, and USF were studied through digital images available through herbarium databases at high enough resolution to allow accurate measurements at millimeter level.

2. CARTREMA AMERICANA (L.) Nesom, **comb. nov.** *Olea americana* L., Mant. Pl. 1: 24. 1767. *Olea laeta* Salisb., Prodr. Stirp. Chap. Allerton, 13. 1796 [illegit. substitute name for *Olea americana* L.]. *Pausia americana* (L.) Raf., Sylva Tellur., 9. 1838. *Pausia odorata* Raf., Sylva Tellur., 9. 1838 [illegit. substitute name for *Olea americana* L.]. *Cartema odorata* (Raf.) Raf., Autik. Bot., 16. 1840 [nom. illeg. superfl.]. *Osmanthus americanus* (L.) Benth. & Hook. f. ex A. Gray, Syn. Fl. N. Amer. 2(1): 78. 1878. *Amarolea americana* (L.) Small, Man. S.E. Fl., 1043. 1933. **LECTOTYPE** (Green 1958, p. 462): **USA**. **South Carolina**. "Habitat in Carolina." (LINN-20.6 digital image!).

Weakley et al. (2011) assumed that *Osmanthus* (Olea) *americana* had been transferred to *Cartrema* by Rafinesque (Sylva Telluriana, 184. 1838), but such is not the case. Rafinesque in 1838 provided *Cartrema* Raf. as a replacement name for *Pausia* Raf. (*Oleaceae*; non *Pausia* Raf., Fl. Tellur. 4: 105. 1836 [publ. 1838], Thymelaeaceae) but he made no mention on page 184 of any species. The very brief entry is at the bottom of the page, at the very end of the book index: "Correction—For *Pausia* 10 real *Cartrema* Raf. meaning perforate nut, having already another G.[enus] *Pausia* in flora telluriana 1139."

The nomenclatural combination in *Cartrema* also has been cited as "Raf. ex B.D. Jackson, Index Kewensis 1: 445. 1893," but Jackson indicated there (p. 445) that the genus *Cartrema* Raf. is a

synonym of *Osmanthus*, and the only species in the entry (as [Cartrema] "Americana Raf.") is indicated to be a synonym of *Osmanthus americana*. Thus a valid combination was made neither by Rafinesque nor by Jackson.

Osmanthus americanus var. *microphyllus* P.S. Green, Notes Roy. Bot. Gard. Edinburgh 22: 463. 1958. **TYPE: MEXICO. Nuevo León**. Sierra Madre Oriental, San Francisco Cañon, about 15 mi SW of Pueblo Galeana, scattered shrub on tops of hills near mouth of cañon, 7500–8000 ft, 14 May 1934, *C.H. Mueller 371* (holotype: NY digital image!; isotypes: A, MICH digital image!, TEX!).

Osmanthus mexicanus Lundell, Phytologia 1: 308. 1939. **TYPE: MEXICO. Chiapas**. Cerro ["Cero" on label] Laguna, Mapastepec, arbor 6–7 m, 25 cm diam., Jan 1938, *E. Matuda 2023* (holotype: MICH digital image!; isotypes: A, F digital image!, GH, LL!, NY-3 sheets digital images!, US digital image!).

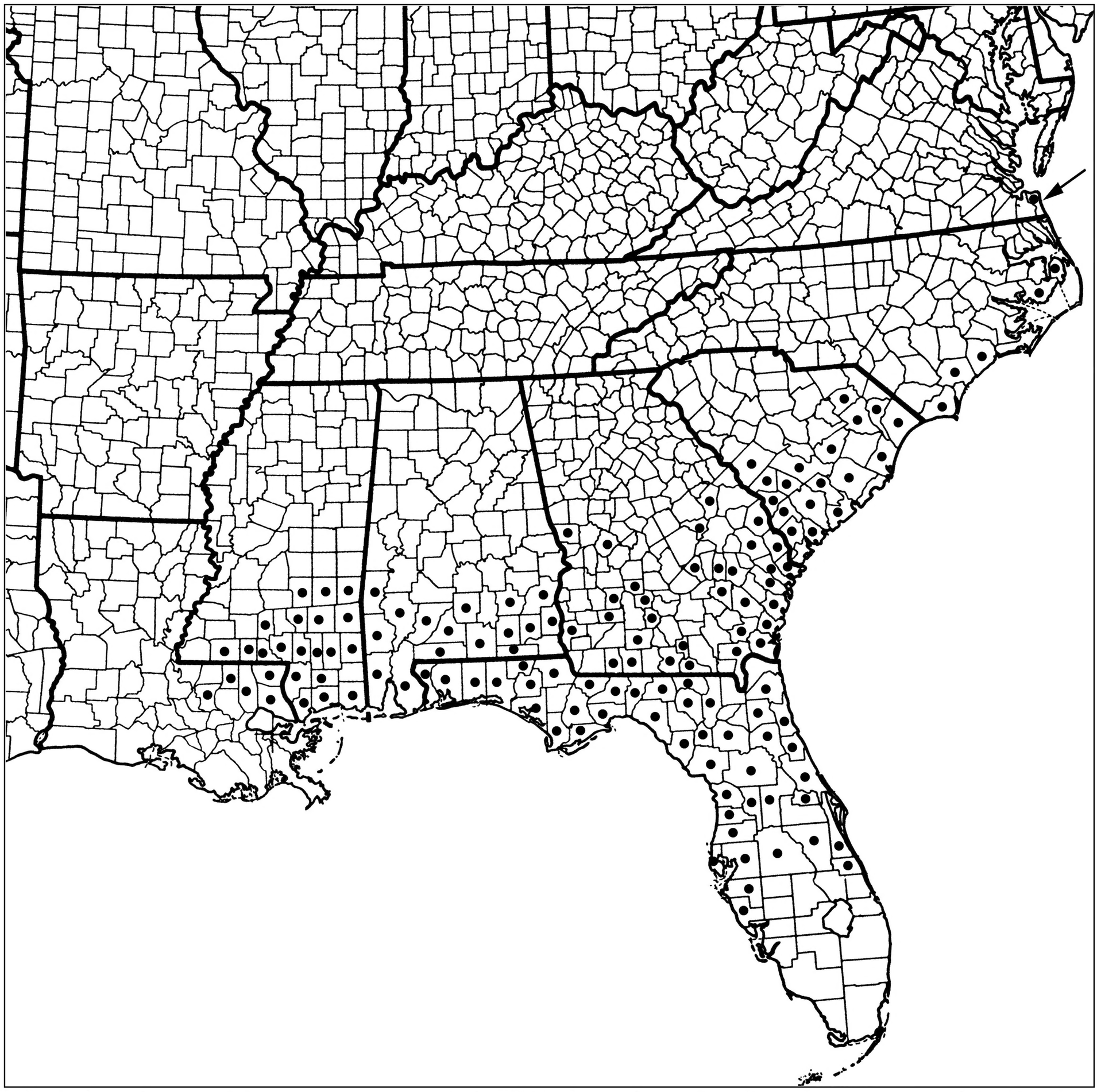
The F and NY isotypes were annotated as *Osmanthus americanus* by P.S. Green in 1989.

Trees or shrubs, 1.5–6(–10) m. **Stems**: trunk single or often branching near ground; bark gray-brown to light gray or silvery, smooth, becoming finely scaly. **Leaves** persistent or semi-persistent, elliptic or oblong-elliptic to oblanceolate or obovate, (5–)8–12(–15) cm x (15–)20–40(–50) mm, base cuneate, margins entire, revolute, apex acute or rarely short-acuminate, obtuse, rounded, or notched, glabrous on both surfaces; petioles (5–)10–15(–20) mm. **Inflorescences** axillary, 12–20-flowered. **Pedicels** 0–1 mm. **Flowers** unisexual or rarely bisexual; corolla white to yellow, tube 2–3 mm, lobes 1.5–2.5 mm, ca. equal tube length, plane to loosely involute. **Drupes** dark bluish purple, globose to globose-ovoid or ellipsoid, (6–)7–10(–11) mm at maturity (dried). ***2n*** = 138.

USA. Flowering Feb–May. Creek, lake, swamp, and sinkhole margins, shell mounds, moist sand ridges, roadside thickets, mesic hardwoods, beech-magnolia, longleaf pine-bluejack oak savannas, upland mixed woods with *Persea*, live oak hammocks, hardwood floodplain forests, swamps (gum-white cedar, gum-magnolia-bay), pine flatwoods, evergreen scrub oak, sand pine and oak scrub; 0–150 m; Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Virginia. Map 2.

Mexico. Flowering Feb–Apr. stream sides, cliff bases, talus, steep banks and hill sides, limestone ridges, juniper matorral, oak, pine-juniper, and pine-oak woodland, mesophytic forests; 1000–2500 m; Chihuahua, Durango [fide Rzed. & Rzed. 2004], Guanajuato, Hidalgo, Jalisco, Nuevo León, Oaxaca, Puebla, Querétaro, San Luis Potosí [fide Rzed. & Rzed. 2004], Sonora, Tamaulipas, Veracruz. Map 3.

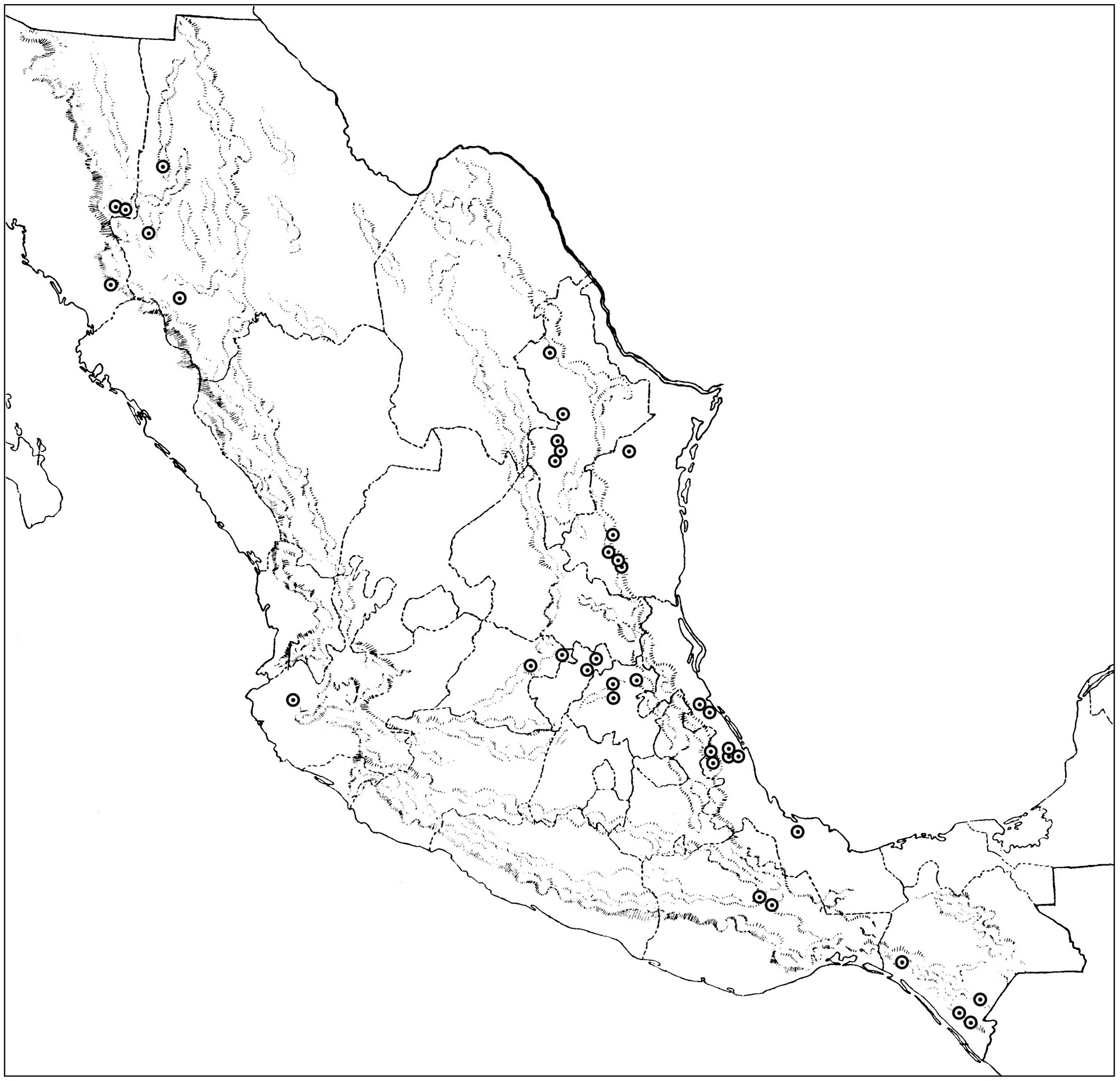
In the southeastern USA, *Cartrema americana* is a common tree of coastal hammocks and other moist sites of the Atlantic and Gulf coasts. The distribution ends in eastern Louisiana, skipping over the rest of Louisiana and Texas to reappear in northwestern Mexico. Texas was cited as part of the range of *Cartrema americana* by Hardin (1974) and this has been repeated in large databases (e.g., BONAP 2012; USDA, NRCS 2012). The basis for the Texas report perhaps is Cooper (1858, p. 253), where "Texas" is listed in a table of geography for *Olea americana*. No documentation for this record has been found, however, and the species is not known to occur natively in Texas. The westernmost part of the range in the USA is in northeastern Louisiana, where it is known from at least five mostly contiguous parishes. I have not seen a voucher for the record shown in Sabine Parish (Thomas & Allen 1998; BONAP 2012), disjunct to the west and on the Texas border, and it seems unlikely that the species occurs natively there. The northernmost record known for *C. americana* is from Virginia Beach County in the southwestern corner of Virginia (Virginia Botanical Associates 2012).



Map 2. Distribution of *Cartrema americana* in the USA. Records are from literature, internet, and first-hand herbarium sources. Arrow points to Virginia Beach County, the northernmost known site for the species.

In Mexico, *Cartrema americana* occurs in two widely disjunct north-south bands, following eastern and western sierras (Map 3). Numerous collections have been made in Chihuahua and Sonora, apparently few from Durango and Jalisco (Table 1). The species is relatively more common in the eastern states, judging from the abundance of collections.

Plants described in 1958 as *Osmanthus americanus* var. *microphyllus*, the type from a gypseous area in south-central Nuevo León, Mexico, can be seen with more collections now available as continuously variable with the rest of the species, agreeing with the earlier assessment by Rzedowski and Rzedowski (2004). In the description of *O. mexicanus* from Chiapas, Lundell (1938, p. 308) noted that it differed from previously described American species "by its small narrow caudate-acuminate leaves, blackened when dry, costa impressed above, and large stigma." Green



Map 3. Distribution of *Cartrema americana* in Mexico. Collections from Durango and San Luis Potosí, alluded to by Rzedowski & Rzedowski (2004) but not mapped here, allow distributions in both eastern and western sierras to be seen as essentially continuous, though apparently sporadic. Most symbols represent more than one collection. Records are from ARIZ and NMC (via SEINET), XAL (via REMIB), TEX-LL (from the Austin herbarium), and Rzedowski & Rzedowski (2004).

treated *O. mexicanus* as distinct in 1958, but at least by 1989 Green had changed his mind and annotated the type specimens at F and NY as *O. americanus*. The current study agrees that the Chiapas plants appear to be continuous with the rest of the species as it occurs northward.

Habitats of Mexican *Cartrema americana* are consistently different (higher elevation, drier sites, in temperate vegetation) from those in the southeastern USA, but no evident differences in morphology exist among Mexican population systems and the species in Mexico is similar to plants of the United States in morphology and range of variability. Fruit size essentially matches that of *C. americana* in the USA; mature fruits on herbarium specimens from Chiapas, Guanajuato, Nuevo León, Querétaro, Sonora, and Tamaulipas measured 7–11 mm. The larger sizes of (10–)12–16 mm

indicated by Rzedowski and Rzedowski (2004) perhaps were from measurements of fresh (vs. dried) fruits.

Rzedowski and Rzedowski (2004) noted that the leaves are produced in a diversity of shape and size — ellíptic or lanceolate to oblanceolate, ovate, or obovate, 1.5–15 x 1–5 cm. They observed that one collection from Guanajuato identified as *Osmanthus americanus* might be a different species (presumably undescribed), because of its consistently small ovate to obovate leaves with rounded to emarginate apices: **Guanajuato**. Mpio. Xichú: Cerro Gordo, 12 km N de Molinitos, *Ventura* y *López 6736* (IEB, MEXU).

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LITERATURE CITED

BONAP. 2012. North American Plant Atlas (US county-level species maps). Biota of North America Program, Chapel Hill, North Carolina. Last update: Oct 2011. <http://www.bonap.org/genera-list.html> Accessed October 2012.

Chapman, A.W. 1889. Flora of the Southern United States (ed. 2). Second Supplement, 1892. American Book Company, New York.

Chapman, A.W. 1897. Flora of the Southern United States (ed. 3). Cambridge Botanical Supply Co., Cambridge, Massachusetts.

Christman, S.P. and W.S. Judd. 1990. Notes on plants endemic to Florida scrub. Florida Scientist 53: 52–73.

Cooper, J.G. 1859. On the distribution of the forests and trees of North America, with notes on its physical geography. Annual report of the Board of Regents of the Smithsonian Institution ... for the Year 1858: 246–280.

Green, P.S. 1958. A monographic revision of *Osmanthus* in Asia and America. Notes Roy. Bot. Gard. Edinburgh 22: 439–542.

Guo, S.-Q., M. Xiong, C.F. Ji, Z.-R. Zhang, D.-Z. Li, and Z.-Y. Zhang. 2011. Molecular phylogenetic reconstruction of *Osmanthus* Lour. (Oleaceae) and related genera based on three chloroplast intergenic spacers. Plant Syst. Evol. 294: 57–64.

Hardin, J.W. 1974. Studies of the southeastern United States flora. IV. Oleaceae. Sida 5: 274-285.

Huck, R.B., W.S. Judd, W.M. Whitten, J.D. Skean, R.P. Wunderlin, and K.R. DeLaney. 1989. A new *Dicerandra* (Labiatae) from the Lake Wales Ridge of Florida, with a cladistic analysis and discussion of endemism. Syst. Bot. 14: 197–213.

Johnson, L.A.S. 1957. A review of the family Oleaceae. Contr. New South Wales Natl. Herb. 2: 395–418.

Lundell, C.L. 1938. Six new trees and shrubs from tropical North America (a). Phytologia 1: 305–309.

Nelson, G. 1994. The Trees of Florida: A Reference and Field Guide. Pineapple Press, Sarasota, Florida.

Nelson, G. 1996. The Shrubs and Woody Vines of Florida: A Reference and Field Guide. Pineapple Press, Sarasota, Florida.

Nelson, G. 2010. The Trees of Florida (ed. 2). Pineapple Press, Sarasota, Florida.

Rafinesque, C.S. 1838. Sylva Telluriana. Printed for the author and publisher, Philadelphia.

Rzedowski, J. and G.C. Rzedowski. 2004. Oleaceae. Flora del Bajío y de Regiones Adyacentes. Fasc. 124: 1–37. <http://www1.inecol.edu.mx/publicaciones/resumeness/FLOBA/Oleaceae124.pdf>
Small, J.K. 1903. Flora of the Southeastern States. Published by the author, New York
Small, J.K. 1913. Flora of the Southeastern States (ed. 2). Published by the author, New York
Small, J.K. 1933. Manual of the Southeastern Flora. Univ. of North Carolina Press, Chapel Hill.
Spach, E. 1839. Histoire Naturelle des Végétaux. Phanérogames, Vol. 8. Boret, Libraire-Éditeur, Paris.
Standley, P.C. and L.O. Williams. 1969. Oleaceae. Flora of Guatemala. Fieldiana: Bot. 24 (Part 8, No. 4): 264–275.
Thomas, R.D. and C.M. Allen. 1998. Atlas of the Vascular Flora of Louisiana. Volume III: Dicotyledons, Fabaceae-Zygophyllaceae. Louisiana Dept. of Wildlife and Fisheries, Natural Heritage Program, Baton Rouge, Louisiana.
USDA, NRCS. 2012. The PLANTS Database. National Plant Data Team, Greensboro, North Carolina. <http://plants.usda.gov> Accessed February 2012.
Virginia Botanical Associates. 2012. Digital Atlas of the Virginia Flora. c/o Virginia Botanical Associates, Blacksburg. <http://www.vaplantatlas.org> Accessed October 2012.
Weakley, A.S, R.J. LeBlond, B.A. Sorrie, C.T. Witsell, L.D. Estes, K.G. Mathews, A. Ebihara, and K. Gandhi. 2011. New combinations, rank changes, and nomenclatural and taxonomic comments in the vascular flora of the southeastern United States. J. Bot. Res. Inst. Texas 5: 437–455.
Wunderlin, R.P. and B.F. Hansen. 2011. Guide to the Vascular Plants of Central Florida (ed. 3). Univ. Press of Florida, Gainesville.
Wunderlin, R.P. and B.F. Hansen. 2012. Atlas of Florida Vascular Plants. [S.M. Landry and K.N. Campbell (application development), Florida Center for Community Design and Research] Inst. for Systematic Botany, Univ. of South Florida, Tampa. <http://www.plantatlas.usf.edu/>

TABLE 1. Collections of *Cartrema americana* from western Mexico; those from ARIZ and NMC from SEINET, not seen.

Chihuahua. Mpio. Batopilas: 3 mi S of Loreto, Rio Mayo Region, along small stream, 5300 ft, 24 May 1986, *Martin, Salmon, & Sundt s.n.* (ARIZ). Mpio. Temósachi: Nabogame, riverbank, 1800 m, 6 Dec 1987, *Laferriére 1320* (ARIZ, TEX). Mpio. Ocampo: Cascada de Basaseachic, base of falls, ashy volcanic rocks, 17 Mar 1986, *Donoghue s.n.* (ARIZ); Basaseachic, S overview to Rancho San Lorenzo Hotel, Rio Mayo Region, sterile tuff and meadow, 1 Oct 1986, *Martin s.n.* (ARIZ); Parque Nacional Cascada de Basaseachic, at overlook called the "Divisadero" ca. 1 km airline S of Cascada, in pine-oak woods, steep N bank, 2100 m, shrub 1.5-2 m tall, 3 Oct 1986, *Spellenberg, Soreng, Corral-Díaz, & Lebgue 8700* (NMC); Parque Nacional "Cascada de Basaseachi," along the trail from Divisadero I to Divisidaro II, W slope, open, with pines, 2100 m, shrub ca. 1 m tall, 12 Nov 1989, *Spellenberg, Corral-Díaz, Lebgue, & Mahrt 10087* (BRIT, NMC). **Jalisco**. Mpio. Talpa de Allende: 6 km sobre la brecha a Talpa de Allende, entrando por la carr. Puerto Vallarta-El Tuito, bosque de pino-encino, 7 Mar 1992, *Campos V. 4526* (TEX 2 sheets). **Sonora.** Mpio. Alamos: ca. Arroyo Verde, Upper Rio Cuchujaqui, base of a rhyolite cliff, 16 May 1990, *Rondeau 90-32* (ARIZ). Mpio. Yécora: 21 km E of Yécora, Arroyo Los Pilares, upstream N of México 16, stream canyon forest, on slopes, 12 Mar 1996, *Reina G. 96-74* (ARIZ); 12.4 km NW of Yecora on road to La Trinidad, Arroyo Agua Blanca, Mesa Grande, pine-oak forest, 1700 m, common 1.5–2.5 m shrub, often with look-alike *Garrya laurifolia*, 29 Sep 1998, *Van Devender 98-1905* (NMC, TEX).

TABLE 2. Unequivocal identifications of *Cartrema floridana* (based on mature or maturing fruits).

Florida. Brevard Co.: *Curtiss 5778* (USF). Citrus Co.: *Cooley 6479* (USF); *Mawhinney 22* (USF); *Mawhinney 77* (USF). DeSoto Co.: E side of Cunningham Rd. ca. 2.6 mi N of State Rd. 70 and 0.5 mi E of Horse Creek, 24 Jul 1970, *Shuey 2064* (FLAS). Hernando Co.: *Davis s.n.* (FLAS); *Genelle & Fleming 422* (USF); *Godfrey 57248* (USF); *vanHoek WW0012* (USF). Highlands Co.: *Alcorn 201* (FLAS); *Bishop & Harris LJ0120* (USF); *Godfrey & Reinert 61016* (BRIT, FLAS); *Judd 5561* (FLAS, FTG); *Kral 22891* (VDB); *Kral 66203* (VDB); *McFarlin 1114* (USF), *11115* (USF); *Orzell & Bridges 15813* (FLAS, FTG, USF); *Skean 2151* (FLAS); *vanHoek & Wargo 782* (USF). Hillsborough Co.: *Bowman s.n.* (USF); *Eilers s.n.* (USF). Indian River Co.: *Kessler s.n.* (USF). Lake Co.: *Ward & Will 3050* (FLAS, FSU, USF). Manatee Co.: *Becker WCO456* (USF); *Gandy LMO185* (USF). Marion Co.: *Thorne 57971* (USF). Orange Co.: *Christman 1883* (FLAS), *Christman 2139* (FLAS), *Christman 2140* (FLAS); *Wunderlin 5645* (USF); *Wunderlin 5327* (USF); *Wunderlin 5702* (USF). Osceola Co.: *Baltzell s.n.* (FLAS); *Christman 655* (FLAS), *Christman 656* (USF); *Grey s.n.* (USF); *Huck 4171* (FLAS, USF); *Kral 64638* (TEX, VDB); *Schallert 20855* (SMU). Pasco Co.: *vanHoek & Petty WB252* (USF). Pinellas Co.: *Petty s.n.* (USF); *Ray et al. 10932* (SMU, USF); *Ray et al. 10964* (SMU, USF); *Thorne 48334* (USF). Polk Co.: *Christman* 57 (FLAS), *Christman* 1039 (FLAS), *Christman 2017* (USF), *Christman* 2084 (FLAS), *Conard s.n.* (FLAS); *Corogin TC192* (FLAS); *DeLaney 1786* (USF); *Lakela 24568* (FLAS, USF); *Orzell & Bridges 16621* (FTG); *Small s.n.* (USF). Sarasota Co.: *Franck 889* (USF); *Kruea s.n.* (FLAS); *Rowe 7290* (USF). Seminole Co.: *Ray 10718* (USF). Sumter Co.: *Kral 7848* (FLAS, USF). Volusia Co.: *Kunzer 439* (USF).